PATENT ABSTRACTS OF JAPAN

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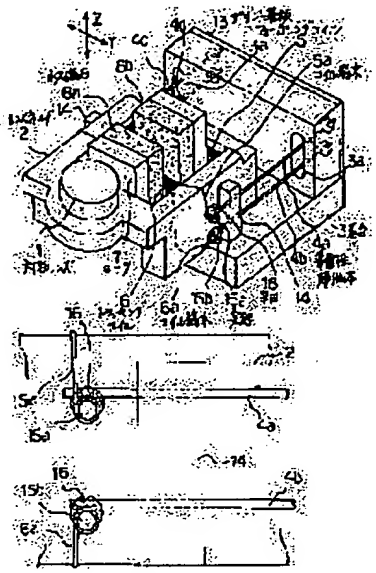
(54) OBJECTIVE LENS DRIVING DEVICE OF OPTICAL DISK DEVICE

(57)Abstract:
PURPOSE: To obtain an objective lens driving device of optical disk having a structure capable of making a contribution to the reduction in the number of parts and man-hours, the improvement in the reliability of soldering parts of coil terminals and the reduction of the size and thickness.
CONSTITUTION: The flank parts of a lens holder 2 are provided with projections 15 by integral molding. The terminals of air core coils 5, 6 for driving the lens holder fixed in the lens holder 2 are twined at these projections 15a, 15b. Conductive elastic bodies 4a, 4b are directly soldered to the coil terminals 5a, 6a twined at the projections 15a, 15b. The projections are disposed by integral molding to project to the side opposite to the fixing parts of these conductive elastic bodies in the same direction as the direction of te conductive elastic bodies 4a, 4b and the conductive elastic bodies 4a, 4b are placed along the projections. The terminals of the air core coils for driving the lens holder fixed in the lens holder are collectively twined at the projections and the conductive elastic bodies and the twined coil terminals are directly soldered to the conductive elastic bodies 4a, 4b.



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* NOTICES *

1. This document has been translated by computer.So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] A conductive elastic body is minded for the lens holder made of synthetic resin holding an objective lens to the pedestal moved and positioned to the recording surface of an optical disk. At least on the other hand, it supports of the direction of focusing, and the directions of tracking free [movement to **]. Form a salient in the aforementioned lens holder in one, prepare it in it, and the terminal of the air cored coil for a lens-holder drive fixed in this lens holder is tucked up to the aforementioned salient. The objective lens driving gear of the optical disk unit characterized by soldering the aforementioned conductive elastic body to the terminal of the coil tucked up to this salient directly.
[Claim 2] A conductive elastic body is minded for the lens holder made of synthetic resin holding an objective lens to the pedestal moved and positioned to the recording surface of an optical disk. At least on the other hand, it supports of the direction of focusing, and the directions of tracking free [movement to **]. And make the opposite side of the fixed part of a conductive elastic body project, and form a salient in one and it is prepared. the aforementioned lens holder -- the direction and this direction of a conductive elastic body -- Mate a conductive elastic body with this salient, and the terminal of the air cored coil for a lens-holder drive fixed to this salient and the conductive elastic body in the lens holder is tucked up collectively. the objective lens driving gear of the optical disk unit characterized by soldering the terminal of this shell wooden-clogs coil to the aforementioned conductive elastic body directly
[Claim 3] The objective lens driving gear of the optical disk unit characterized by fixing the aforementioned conductive elastic body to the aforementioned lens holder by insert molding in claims 1 or 2.
[Claim 4] The objective lens driving gear of the optical disk unit characterized by fixing the aforementioned drive coil to the aforementioned lens holder by insert molding in either to claims 1-3.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] this invention relates to the objective lens driving gear in the optical disk unit which can project an optical spot on a disk-like record medium, and can read information optically.
[0002]
[Description of the Prior Art] Drawing 5 (A) is the perspective diagram showing an example of the objective lens driving gear of the conventional optical disk, it is an objective lens for 1 meeting the record medium which becomes with an optical disk, converging a light beam, irradiating a record medium, and reading information optically, and this objective lens 1 is held at a lens holder 2. 3 is a pedestal which moves in the direction of tracking to the recording surface of an optical disk according to a positioning mechanism (not shown), and is positioned. A lens holder 2 is supported free [movement] to this pedestal 3 through four conductive elastic bodies 4a, 4b, 4c, and 4d. namely, the hole prepared in the pedestal 3, while inserting each-two right and left at a time the conductive elastic bodies 4a, 4b, 4c, and 4d in 3a By penetrating to the printed circuit board 13 fixed to this pedestal 3, soldering to it, fixing a conductive elastic bodies [4a, 4b, 4c, and 4d] end face, soldering a nose of cam to the printed circuit board 9 fixed to the side of a lens holder 2, and fixing The lens holder 2 is supported to the ****** type possible [movement] to a pedestal 3. In a lens holder 2, the focusing coil 5 and the tracking coil 6 are held.
[0003] electromagnetism with the current i1 and i2 which pass in these coils 5 and 6, respectively as shown in a pedestal 3 on the other hand at drawing 6 -- the yoke 7 and permanent magnets 8a and 8b of a KO typeface which constitute the magnetic circuit driven by operation in the direction of a focus which shows a lens holder 2 1, i.e., an objective lens, to Arrow Z, and the direction of tracking shown in Arrow Y are carried In addition, the tracking coil 6 is what constructed 2 sets of coils to a series, and fixed in the focusing coil 5, a center section a mainly interlinks with the magnetic flux between [of two pieces] permanent magnet 8a and 8b, and Flank b is arranged outside so that a drive may not be affected substantially. Thus, the reason for moving in the direction of a focus and the direction of tracking, and carrying out position control of the objective lens 1 is for making the face deflection and eccentricity of a disk follow and moving an objective lens 1.
[0004] As mentioned above, the printed circuit board 9 for connecting the terminal of the ends of coils 5 and 6 to the conductive elastic bodies 4a, 4b, 4c, and 4d, respectively is fixed to the both-sides side of a lens holder 2. This printed circuit board 9 has copper foil 12 which connects between the lands 11 which connect 5a and 6a with solder 10 in the conductive elastic bodies 4a and 4b or the end of an end winding, and these lands 11 so that one printed circuit board may be shown in drawing 5 (B).
[0005] As other conventional objective lens driving gears, a lens holder and the bobbin around which the coil was wound are constituted on another object, a bobbin is attached in a lens holder, the end of an end winding is tucked up to the salient prepared in the bobbin, and the structure which soldered the conductive elastic body in the end of an end winding is indicated by JP,6-274910,A.
[0006]

[Problem(s) to be Solved by the Invention] In the conventional objective lens driving gear shown in drawing 5 Since the printed circuit board 9 of a total of both two sides is used for combination with 5a, 6a, 5b, 6b, and the conductive elastic bodies 4a, 4b, 4c, and 4d as pars intermedia material, in the end of an end winding The top which needs the work which pastes up a printed circuit board 9 on a lens holder 2, soldering also needed to perform a total of eight places, and had four right and left at a time the trouble that part mark and a man day increased. Moreover, since the portion of the copper foil 12 with which a miniaturization is required, a land 11 becomes small or the aforementioned printed circuit board 9 also connects coils 5 and 6 and the conductive elastic bodies 4a, 4b, 4c, and 4d becomes short with a miniaturization and thin-shape-izing, There was a problem that the reliability of the solder section fell -- the soldering itself will become difficult, or when soldering coils 5 and 6 and conductive elastic bodies [4a, 4b, 4c, and 4d] one side, the solder of already soldered another side will melt.
[0007] Moreover, since it was needed like the bobbin shipfitter while part mark increased, since the bobbin was needed for the aforementioned official report in the structure of winding a coil around the structure of a publication, i.e., a bobbin, and attaching the bobbin in a lens holder, in addition to the lens holder, only the part which causes the increase in a man day and prepares a bobbin in a lens holder needed the space, and had the trouble of becoming the obstacle of a miniaturization and thin-shape-izing.

[0008] this invention aims at offering the objective lens driving gear of the optical disk of structure which part mark and a man day reduce and can be contributed to improvement in the reliability of the soldering section in the end of an end winding, and a miniaturization and thin-shape-izing in view of the above-mentioned trouble.
[0009]
[Means for Solving the Problem] The objective lens driving gear of the optical disk of this invention A conductive elastic body is minded for the lens holder made of synthetic resin holding an objective lens to the pedestal moved and positioned to the recording surface of an optical disk. At least on the other hand, it supports of the direction of focusing, and the directions of tracking free [movement to **]. It is characterized by soldering the aforementioned conductive elastic body to the terminal of the coil which formed the salient in the aforementioned lens holder in one, prepared it in it, tucked up the terminal of the air cored coil for a lens-holder drive fixed in this lens holder to the aforementioned salient, and was tucked up to this salient directly.
[0010] moreover, this invention -- the aforementioned lens holder -- the direction and this direction of a conductive elastic body -- and the opposite side of the fixed part of a conductive elastic body is made to project, a salient is formed in one, and is prepared, a conductive elastic body is mated with this salient, the terminal of the air cored coil for a lens-holder drive fixed to this salient and the conductive elastic body in the lens holder is tucked up collectively, and it is characterized by soldering the terminal of this shell wooden-clogs coil to the aforementioned conductive elastic body directly
[0011] In this invention, a conductive elastic body and a coil are preferably fixed to one by insert molding, although you may fix to a lens holder by adhesion.
[0012]
[Function] In this invention, a salient is prepared in a lens holder, and in order to tuck up the end of an end winding to this lens holder and to solder a conductive elastic body to it directly in the end of the end winding, a printed circuit board becomes unnecessary. Moreover, a lens holder is a product made of synthetic resin, and there is no problem of the bad influence by transfer of the heat of the soldering sections in soldering. Moreover, since the coil for a lens-holder drive which becomes by the air cored coil was fixed to the lens holder and the salient is tucked up for the end of an end winding, the bobbin is unnecessary.
[0013] To a lens holder, in the direction and this direction of a conductive elastic body moreover, and by preparing by making the opposite side of the fixed part of a conductive elastic body project, and forming a salient in one, and mating a conductive elastic body with this salient When it becomes possible to tuck up collectively the terminal of the air cored coil for a lens-holder drive fixed to this salient and the

conductive elastic body in the lens holder and a conductive elastic body and a salient coalesce When the end of an end winding tucks up and the intensity of a portion solders a large next door and the tucked-up terminal of a coil to the aforementioned conductive elastic body directly, as a result of being able to make the soldering section long to the longitudinal direction of a conductive elastic body, soldering area can solder firmly by becoming large.

[0014] If a coil and a conductive elastic body are fixed to a lens holder by insert molding, a routing will be simplified and positioning accuracy will improve.

[0015]

[Example] The perspective diagram and drawing 1 (B) which show the driving gear of the objective lens according [drawing 1 (A)] to this invention are the side elevation showing connection structure with 5a and 6a in the conductive elastic body 4 in this example, and the end of an end winding. In drawing 1 , the same sign as drawing 5 and drawing 6 shows the same parts. For example, the polyphenylene ape fight (PPS) resin which does not soften a lens holder 2 in the case of the below-mentioned soldering processing, either, and does not deform, It is what consists of heat-resistant synthetic-resin Plastic solids, such as full-aromatic system polyester resin (liquid crystal polymer). Make the both-sides side of this lens holder 2 project the conductive elastic bodies [4a, 4b, 4c, and 4d] bond part 14, and it forms in it at one. It fixes at a time two conductive elastic bodies 4a, 4b, 4c, and 4d which become this bond part 14 from metal-wire material and plates, such as phosphor bronze and a beryllium copper, by insert molding, respectively. In addition, the combination to the conductive elastic bodies [4a 4b, 4c, and 4d] bond part 14 prepares a hole in a bond part 14, inserts the conductive elastic bodies 4a, 4b, 4c, and 4d in the hole, and can also adopt the structure fixed with adhesives. The fixed structure over the pedestal 3 by the side of a conductive elastic bodies [4a, 4b, 4c, and 4d] end face is as drawing 5 having explained.

[0016] Near the aforementioned bond part 14, have an interval up and down, and the method of outside is made to project two pin-like salients 15a and 15b, and they are really prepared by fabrication, respectively. In one end-winding end of the focusing coil 5 which becomes the pin-like salients 15a and 15b formed in one side of a lens holder 2 by the air cored coil as shown in drawing 6 And 5a, 6a is tucked up in one end-winding end of the tracking coil 6 which becomes by the air cored coil, and 5b and 6b are tucked up in the end-winding end of another side to the pin-like salient (not shown) formed in the side of another side of a lens holder 2 like the aforementioned salients 15a and 15b. Thus, 5a, 6a, 5b, and 6b are directly fixed to the conductive elastic bodies 4a, 4b, 4c, and 4d with solder 16 in the end of an end winding it tucked up, respectively.

[0017] In addition, in drawing 1 (A) and (B), although the aforementioned bond part 14 and Salients 15a and 15b are formed in the side of a lens holder 2, they may prepare a bond part and a salient in the upper surface or the inferior surface of tongue of the aforementioned lens holder 2.

[0018] Thus, by forming Salients 15a and 15b in a lens holder 2, tucking up 5a, 6a, 5b, and 6b to these salients 15a and 15b in the end of an end winding, and soldering the conductive elastic bodies 4a, 4b, 4c, and 4d to this directly, the conventional printed circuit board 9 becomes unnecessary, and part mark are reduced. Moreover, when the process which pastes up a printed circuit board 9 on a lens holder 2 becomes unnecessary, since a soldering part is halved in four places, a man day is also reduced. Moreover, Salients 15a and 15b are formed with the same resin material as a lens holder 2, for a low reason, they have less thermal influence which one soldering has on another side than the copper foil 12 of the aforementioned printed circuit board 9, and the thermal conductivity between salient 15a and 15b does not melt them again with the heat which solders the already soldered portion later. Such, that the thermal influence of [between the solder sections] is mitigated, and when the interval of the part to solder spreads, the soldering itself becomes easy and the reliability of the solder section can be raised. Moreover, although there is also the method of embedding a metal pin at a lens holder 2 as a method of preparing a salient in a lens holder 2, as compared with the case where a metal pin is fixed to a lens holder 2, a man day and part mark are reduced by really fabricating Salients 15a and 15b like this invention.

[0019] Moreover, although the focusing coil 5 which fixed the tracking coil 6 which becomes by the air

cored coil may be fixed to the wall of a lens holder 2 with adhesives 17 as shown in the plan of drawing 2 (A), as shown in drawing 2 (B) By really fixing the aforementioned coils 5 and 6 to inner **** of a lens holder 2 by fabrication The crevice 18 between the focusing coil 5 in the corner of inner **** shown in drawing 2 (A) and the wall of a lens holder 2 is lost. There is no position gap of the focusing coil 5 at the time of adhesion, and positioning to the lens holder 2 of the focusing coil 5 and the tracking coil 6 can carry out with a sufficient precision. Moreover, the adhesion process over the lens holder 2 of the focusing coil 5 becomes unnecessary, and a man day decreases. Moreover, while part mark and a man day are reduced as compared with the case where the bobbin which formed the focusing coil 5 and the tracking coil 6 is attached in a lens holder 2, the positioning accuracy of the focusing coil 5 and the tracking coil 6 also improves.

[0020] Moreover, although the conductive elastic bodies 4a, 4b, 4c, and 4d may be inserted in the hole of a bond part 14 and you may fix by adhesion, anchoring to the conductive elastic bodies [4a 4b, 4c, and 4d] lens holder 2 becomes unnecessary like the aforementioned example by really fixing four conductive elastic bodies to a lens holder 2 by fabrication.

[0021] Drawing 3 (A) and (B) are the perspective diagrams showing other examples of this invention, respectively. All to the lateral portion of a lens holder 2 from the bond part 14 of the aforementioned conductive elastic bodies 4a and 4b In the direction and this direction of the conductive elastic bodies 4a and 4b, and conductive elastic body 4a, The opposite side of the fixed part to the pedestal 3 of 4b is made to project. Salients 19a, 19b, or 20a, 20b is formed in one. to these salients 19a and 19b, or 20a and 20b Conductive elastic body 4a, 4b is mated, 5a and 6a are collectively tucked up in the end of an end winding to these salients 19a and 19b, or 20a, 20b and the conductive elastic bodies 4a and 4b, and the terminals 5a and 6a of this shell wooden-clogs coil are fixed to the aforementioned conductive elastic bodies 4a and 4b with the direct solder 16 It is combined like [elastic bodies / conductive / 4c and 4d] a lens holder 2.

[0022] Thus, by mating the conductive elastic bodies 4a and 4b with Salients 19a and 19b, or 20a and 20b, and rolling 5a and 6a simultaneously in the end of an end winding It tucks up by coalesce with Salients 19a and 19b, or 20a, 20b and the conductive elastic bodies 4a and 4b, the intensity of a portion goes up, and it becomes fixable [the stable end of an end winding], and the area of solder 16 spreads, and solder intensity goes up. By preparing Slots 23a and 23b, or 24a and 24b in Salients 19a and 19b, or 20a and 20b, and considering as the structure to which the conductive elastic bodies 4a and 4b fitted into these slots 23a and 23b, or 24a and 24b especially, there is no gap of the conductive elastic bodies 4a and 4b, and a bond strength goes up. Moreover, as compared with the case where it turns upward like drawing 3 (A), it becomes easy like drawing 3 (B) **** or an inclined plane, then to soldering work the installation side of the conductive elastic bodies 4a and 4b about an installation side.

[0023] Moreover, in order to give a difference to the elasticity of a conductive elastic body in the direction of focusing, and the direction of tracking when giving elasticity only about the direction of focusing or, as shown in drawing 3 (C), When using the conductive elastic body 21 of a tabular or a cross-section square shape, by doubling the conductive elastic body 21 to salient 19 in a field Since the bond strength depended for tucking up can go up and the soldering section can be lengthened at the longitudinal direction of the conductive elastic body 21, the size of solder 16 is also secured and soldering intensity goes up.

[0024] Moreover, drawing 3 (C) differs from the aforementioned example which forms four conductive elastic bodies 4a, 4b, 4c, and 4d. Although the example of the objective lens driving gear which forms the conductive elastic body 21 per each right and left, and connects the conductive elastic body 21 to one kind of coil (the focusing coil 5 or tracking coil 6) is shown In addition, the structure of this invention is applicable also to the objective lens driving gear of the structure of moving the degree of angle of inclination to the medium of the direction of a jitter, or an objective lens to the method lack of an amendment, and moving a lens holder 2 in many directions.

[0025] Drawing 4 is other examples of this invention. this example A lens holder 2 not by the ****** type but by the base material 22 and pedestal 3 which can prepare apart from a pedestal 3 Conductive

elastic body 4a, Ends (4b, 4c, and 4d) are supported, a lens holder 2 is attached in conductive elastic bodies [4a, 4b 4c, and 4d] pars intermedia with the structure which used salient 15 and solder 16 of aforementioned drawing 1 , and the same effect as the aforementioned example is obtained for it also in this example.

[0026] In addition, if the metal wire to which solder plating and copper coating were performed as a conductive elastic body is used and low-temperature soldering copper wire is used as the focusing coil 5 or a tracking coil 6, the workability in soldering will improve further.

[0027]

[Effect of the Invention] Since the bobbin which became unnecessary [the printed circuit board used for combination with the end of an end winding and a conductive elastic body] since the aforementioned conductive elastic body was soldered directly, and wound the coil around the terminal of the coil which according to the claim 1 really prepared the salient in the lateral portion of a lens holder by fabrication, tucked up the terminal of the air cored coil for a lens-holder drive fixed to this salient in the lens holder, and was tucked up to this salient also becomes unnecessary, part mark can be reduced. Moreover, since the process which pastes up a printed circuit board on a lens holder becomes unnecessary as compared with the case where a printed circuit board is used and the number of soldering parts is reduced, a man day is reduced. Moreover, even if it compares with structure conventionally which attaches a bobbin in a lens holder, part mark and man day reduction can be attained.

[0028] Moreover, since the end of an end winding and a conductive elastic body are soldered directly, the problem that the land of a printed circuit board becomes small, or the copper foil section becomes short does not occur, but on the occasion of small and thin-shape-izing, the soldering itself is easy and it can improve the reliability of the solder section. Moreover, it is not necessary to make small the soldering section in the end of an end winding, and since the space in which the bobbin around which a coil is wound is prepared also becomes unnecessary, a miniaturization and thin shape-ization can be attained.

[0029] According to the claim 2, to the lateral portion of a lens holder in the direction and this direction of a conductive elastic body And since the terminal of the air cored coil for a lens-holder drive which the opposite side of a conductive elastic body was made to project, really prepared the salient by fabrication, mated the conductive elastic body with this salient, and was fixed to this salient and the conductive elastic body in the lens holder was tucked up collectively It suits, a salient and a conductive elastic body reinforce mutually, it tucks up and the intensity of the section goes up, as a result of becoming fixable [the stable end of an end winding] and being able to lengthen the soldering section at the longitudinal direction of a conductive elastic body, soldering area spreads and soldering intensity goes up.

[0030] According to the claim 3, since the conductive elastic body was fixed to the lens holder by insert molding, anchoring to the lens holder of a conductive elastic body becomes unnecessary, and it can contribute to reduction of a man day.

[0031] According to the claim 4, since the coil for a drive was fixed to the lens holder by insert molding, the man day for coil anchoring is reduced and positioning accuracy improves as compared with the case where a coil is attached using adhesion or a bobbin.

[Translation done.]

* NOTICES *

CORRECTION or AMENDMENT

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[Section partition] The 4th partition of the 6th section.
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[Procedure revision]
[Filing Date] January 6, Heisei 9.
[Procedure amendment 1]
[Document to be Amended] Specification.
[Item(s) to be Amended] Claim.
[Method of Amendment] Change.
[Proposed Amendment]
[Claim(s)]
[Claim 1] At least on the other hand, the lens holder made of synthetic resin holding an objective lens is supported of the direction of focusing, and the directions of tracking free [movement] to ** through a conductive elastic body to the pedestal moved and positioned to the recording surface of an optical disk.
A salient is formed in the aforementioned lens holder in one, and is prepared in it.
The terminal of a coil without the bobbin for a lens-holder drive fixed in this lens holder is tucked up to the aforementioned salient.
The objective lens driving gear of the optical disk unit characterized by soldering the aforementioned conductive elastic body to the terminal of the coil tucked up to this salient directly.
[Claim 2] At least on the other hand, the lens holder made of synthetic resin holding an objective lens is supported of the direction of focusing, and the directions of tracking free [movement] to ** through a conductive elastic body to the pedestal moved and positioned to the recording surface of an optical disk.
the aforementioned lens holder -- the direction and this direction of a conductive elastic body -- and it

projects to the opposite side of the fixed part of a conductive elastic body -- making -- a salient -- one ---like -- forming -- preparing
A conductive elastic body is mated with this salient.
The terminal of a coil without the bobbin for a lens-holder drive fixed to this salient and the conductive elastic body in the lens holder is tucked up collectively.
the objective lens driving gear of the optical disk unit characterized by soldering the terminal of this shell wooden-clogs coil to the aforementioned conductive elastic body directly
[Claim 3] In claims 1 or 2
The objective lens driving gear of the optical disk unit characterized by fixing the aforementioned conductive elastic body to the aforementioned lens holder by insert molding.
[Claim 4] In either to claims 1-3
The objective lens driving gear of the optical disk unit characterized by fixing the aforementioned drive coil to the aforementioned lens holder by insert molding.
[Claim 5] At least on the other hand, the lens holder made of synthetic resin holding an objective lens is supported of the direction of focusing, and the directions of tracking free [movement] to ** through a conductive elastic body to the pedestal moved and positioned to the recording surface of an optical disk.
The installation side of a conductive elastic body is formed in the aforementioned lens holder in one, and is established in it.
A conductive elastic body is mated with this installation side.
The objective lens driving gear of the optical disk unit characterized by soldering directly the terminal of a coil without the bobbin for a lens-holder drive fixed in the aforementioned lens holder to the aforementioned conductive elastic body.
[Procedure amendment 2]
[Document to be Amended] Specification.
[Item(s) to be Amended] 0009.
[Method of Amendment] Change.
[Proposed Amendment]
[0009]
[Means for Solving the Problem] The objective lens driving gear of the optical disk of this invention A conductive elastic body is minded for the lens holder made of synthetic resin holding an objective lens to the pedestal moved and positioned to the recording surface of an optical disk. At least on the other hand, it supports of the direction of focusing, and the directions of tracking free [movement to **]. It is characterized by soldering the aforementioned conductive elastic body to the terminal of the coil which formed the salient in the aforementioned lens holder in one, prepared it in it, tucked up the terminal of a coil without the bobbin for a lens-holder drive fixed in this lens holder to the aforementioned salient, and was tucked up to this salient directly.
[Procedure amendment 3]
[Document to be Amended] Specification.
[Item(s) to be Amended] 0010.
[Method of Amendment] Change.
[Proposed Amendment]
[0010] this invention to the aforementioned lens holder moreover, in the direction and this direction of a conductive elastic body And make the opposite side of the fixed part of a conductive elastic body project, and form a salient in one and it is prepared. a conductive elastic body is mated with this salient, the terminal of a coil without the bobbin for a lens-holder drive fixed to this salient and the conductive elastic body in the lens holder is tucked up collectively, and it is characterized by soldering the terminal of this shell wooden-clogs coil to the aforementioned conductive elastic body directly Moreover, this invention is characterized by soldering directly the terminal of a coil without the bobbin for a lens-holder drive which formed the installation side of a conductive elastic body in one, established it, mated the conductive elastic body with this installation side, and was fixed to the aforementioned lens holder in the

aforementioned lens holder to the aforementioned conductive elastic body.
[Procedure amendment 4]
[Document to be Amended] Specification.
[Item(s) to be Amended] 0012.
[Method of Amendment] Change.
[Proposed Amendment]
[0012]
[Function] In order a salient is prepared in a lens holder in this invention, tuck up the end of an end winding to this lens holder, and solder a conductive elastic body directly in the end of the end winding, or to establish the installation side of a conductive elastic body in a lens holder at one, to attach a conductive elastic body to the installation side and to solder the end of an end winding to a conductive elastic body directly, it becomes unnecessary [a printed circuit board]. Moreover, a lens holder is a product made of synthetic resin, and there is no problem of the bad influence by transfer of the heat of the soldering sections in soldering. Moreover, since the coil for a lens-holder drive which becomes with a coil without a bobbin is fixed to a lens holder, the bobbin is unnecessary.
[Procedure amendment 5]
[Document to be Amended] Specification.
[Item(s) to be Amended] 0013.
[Method of Amendment] Change.
[Proposed Amendment]
[0013] moreover, a lens holder -- the direction and this direction of a conductive elastic body -- and the thing for which the opposite side of the fixed part of a conductive elastic body is made to project, and a salient is formed in one It becomes possible to tuck up collectively the terminal of a coil without the bobbin for a lens-holder drive fixed to this salient and the conductive elastic body in the lens holder by preparing and mating a conductive elastic body with this salient. When a conductive elastic body and a salient coalesce, the end of an end winding tucks up and the intensity of a portion solders a large next door and the tucked-up terminal of a coil to the aforementioned conductive elastic body directly As a result of being able to make the soldering section long to the longitudinal direction of a conductive elastic body, soldering area can solder firmly by becoming large.
[Procedure amendment 6]
[Document to be Amended] Specification.
[Item(s) to be Amended] 0016.
[Method of Amendment] Change.
[Proposed Amendment]
[0016] Near the aforementioned bond part 14, have an interval up and down, and the method of outside is made to project two pin-like salients 15a and 15b, and they are really prepared by fabrication, respectively. And one end of end winding 5a of the focusing coil 5 which becomes with the coil which does not have a bobbin as shown in drawing 6 in the pin-like salients 15a and 15b formed in one side of a lens holder 2, 6a is tucked up in one end-winding end of the tracking coil 6 which becomes with a coil without a bobbin, and 5b and 6b are tucked up in the end-winding end of another side to the pin-like salient (not shown) formed in the side of another side of a lens holder 2 like the aforementioned salients 15a and 15b. Thus, 5a, 6a, 5b, and 6b are directly fixed to the conductive elastic bodies 4a, 4b, 4c, and 4d with solder 16 in the end of an end winding it tucked up, respectively.
[Procedure amendment 7]
[Document to be Amended] Specification.
[Item(s) to be Amended] 0019.
[Method of Amendment] Change.
[Proposed Amendment]
[0019] Moreover, as shown in the plan of drawing 2 (A), the focusing coil 5 which fixed the tracking coil 6 which becomes with a coil without a bobbin is fixed to the wall of a lens holder 2 with adhesives

17. Although ** is good, as shown in drawing 2 (B), by really fixing the aforementioned coils 5 and 6 to inner **** of a lens holder 2 by fabrication, the crevice 18 between the focusing coil 5 in the corner of inner **** shown in drawing 2 (A) and the wall of a lens holder 2 is lost, there is no position gap of the focusing coil 5 at the time of adhesion, and positioning to the lens holder 2 of the focusing coil 5 and the tracking coil 6 can carry out with a sufficient Moreover, the adhesion process over the lens holder 2 of the focusing coil 5 becomes unnecessary, and a man day decreases. Moreover, while part mark and a man day are reduced as compared with the case where the bobbin which formed the focusing coil 5 and the tracking coil 6 is attached in a lens holder 2, the positioning accuracy of the focusing coil 5 and the tracking coil 6 also improves.

[Procedure amendment 8]
[Document to be Amended] Specification.
[Item(s) to be Amended] 0027.
[Method of Amendment] Change.
[Proposed Amendment]
[0027]
[Effect of the Invention] Since the aforementioned conductive elastic body was directly soldered to the terminal of the coil which really prepared the salient in the lateral portion of a lens holder by fabrication, tucked up the terminal of a coil without the bobbin for a lens-holder drive fixed to this salient in the lens holder, and was tucked up to this salient according to the claim 1. Since the bobbin around which the printed circuit board used for combination with the end of an end winding and a conductive elastic body became unnecessary, and the coil was wound also becomes unnecessary, part mark can be reduced. Moreover, since the process which pastes up a printed circuit board on a lens holder becomes unnecessary as compared with the case where a printed circuit board is used and the number of soldering parts is reduced, a man day is reduced. Moreover, even if it compares with structure conventionally which attaches a bobbin in a lens holder, part mark and man day reduction can be attained.

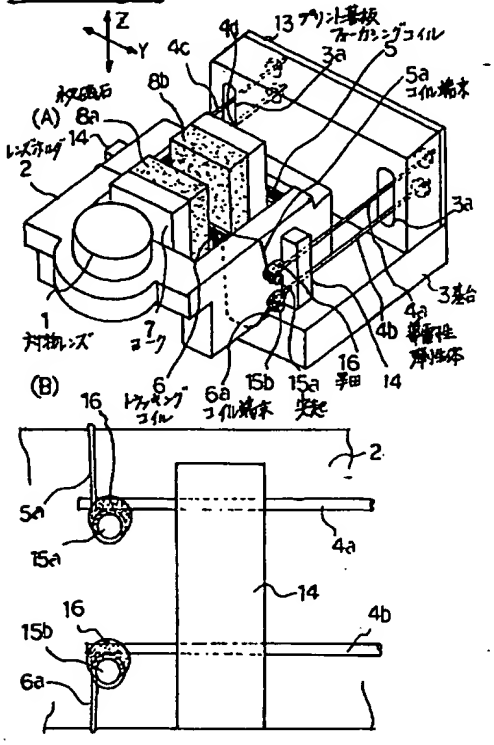
[Procedure amendment 9]
[Document to be Amended] Specification.
[Item(s) to be Amended] 0029.
[Method of Amendment] Change.
[Proposed Amendment]
[0029] according to a claim 2 -- the lateral portion of a lens holder -- the direction and this direction of a conductive elastic body -- and it projects to the opposite side of a conductive elastic body -- making -- a salient -- one -- fabrication Since the terminal of a coil without the bobbin for a lens-holder drive which prepared, mated the conductive elastic body with this salient, and was fixed to this salient and the conductive elastic body in the lens holder was tucked up collectively It suits, a salient and a conductive elastic body reinforce mutually, it tucks up and the intensity of the section goes up, as a result of becoming fixable [the stable end of an end winding] and being able to lengthen the soldering section at the longitudinal direction of a conductive elastic body, soldering area spreads and soldering intensity goes up.

[Translation done.]

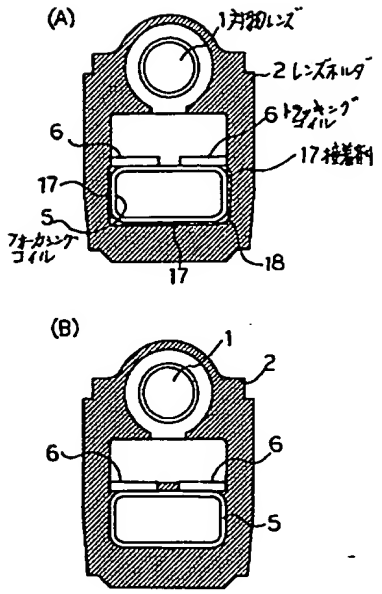
* NOTICES *

DRAWINGS

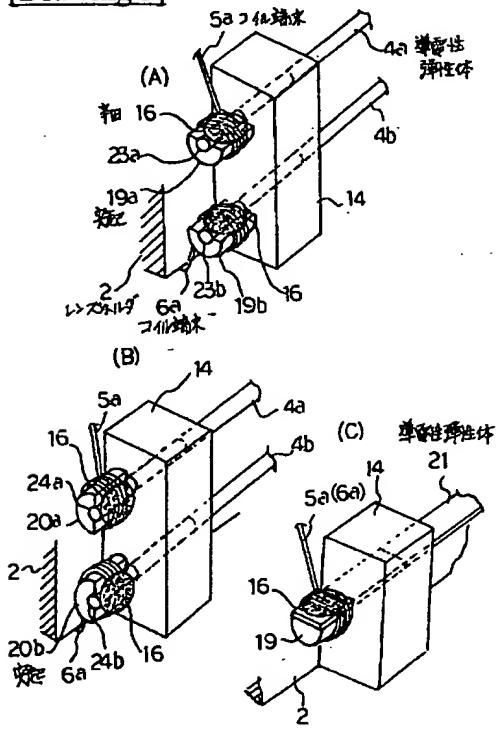
[Drawing 1]



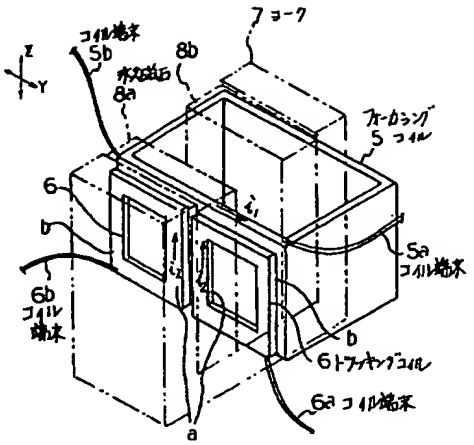
[Drawing 2]



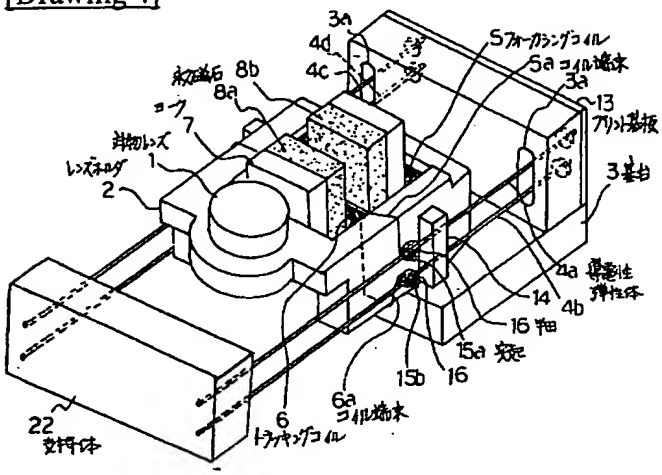
[Drawing 3]



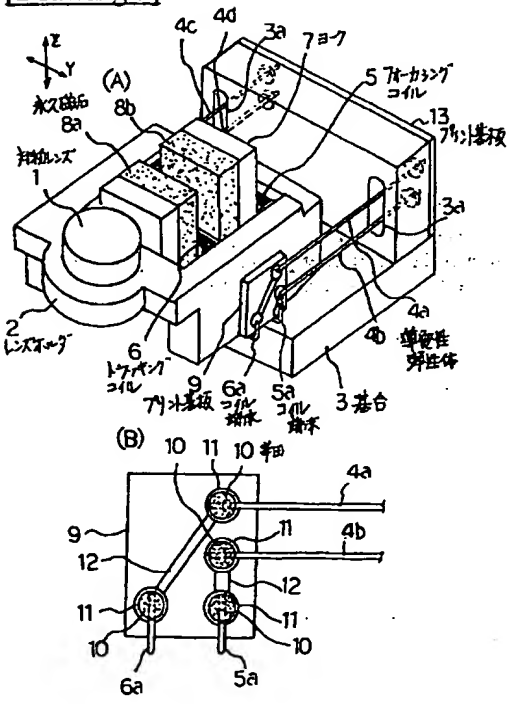
[Drawing 6]



[Drawing 4]



[Drawing 5]



[Translation done.]

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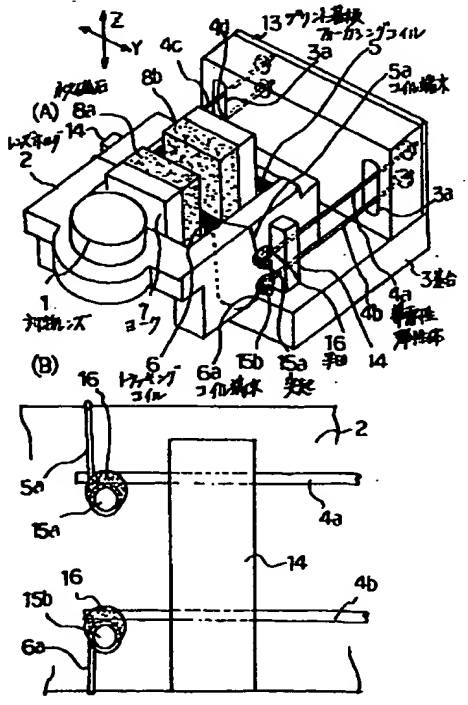
(54)【発明の名称】　光ディスク装置の対物レンズ駆動装置

(57)【要約】
【目的】部品点数や工数が低減し、かつコイル端末の半田付け部の信頼性の向上や、小型化、薄型化に寄与できる構造の光ディスクの対物レンズ駆動装置を提供する。
【構成】レンズホルダ２の側面部に突起１５を一体成形により設ける。レンズホルダ２内に固定されたレンズホルダ駆動用の空心コイル５、６の端末を突起１５ａ、１５ｂにからげる。突起１５ａ、１５ｂにからげたコイル端末５ａ、６ａに、導電性弾性体４ａ、４ｂを直接半田付けする。また、導電性弾性体の方向と同方向に、かつ導電性弾性体の固定部の反対側に突出させて突起を一体成形により設け、突起に導電性弾性体を添わせ、突起と導電性弾性体にレンズホルダ内に固定されたレンズホルダ駆動用の空心コイル端末をまとめてからげ、からげたコイル端末を、前記導電性弾性体に直接半田付けした。



1

【特許請求の範囲】

【請求項1】光ディスクの記録面に対して移動され位置設定される基台に対し、対物レンズを保持する合成樹脂製レンズホルダを、導電性弾性体を介して、フォーカシング方向とトラッキング方向のうちの少なくとも一方向に移動自在に支持し、

前記レンズホルダに突起を一体的に形成して設け、

該レンズホルダ内に固定されたレンズホルダ駆動用の空心コイルの端末を前記突起にからげ、

該突起にからげたコイルの端末に、前記導電性弾性体を直接半田付けしたことを特徴とする光ディスク装置の対物レンズ駆動装置。

【請求項2】光ディスクの記録面に対して移動され位置設定される基台に対し、対物レンズを保持する合成樹脂製レンズホルダを、導電性弾性体を介して、フォーカシング方向とトラッキング方向のうちの少なくとも一方向に移動自在に支持し、

前記レンズホルダに、導電性弾性体の方向と同方向に、かつ導電性弾性体の固定部の反対側に突出させて突起を一体的に形成して設け、

該突起に導電性弾性体を添わせ、

該突起と導電性弾性体にレンズホルダ内に固定されたレンズホルダ駆動用の空心コイルの端末をまとめてからげ、

該からげたコイルの端末を、前記導電性弾性体に直接半田付けしたことを特徴とする光ディスク装置の対物レンズ駆動装置。

【請求項3】請求項1または2において、

前記導電性弾性体を前記レンズホルダにインサート成形により固定したことを特徴とする光ディスク装置の対物レンズ駆動装置。

【請求項4】請求項1から3までのいずれかにおいて、前記レンズホルダに前記駆動コイルをインサート成形により固定したことを特徴とする光ディスク装置の対物レンズ駆動装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、ディスク状の記録媒体に光スポットを投射して光学的に情報を読み取ることができる光ディスク装置における対物レンズ駆動装置に関する。

【0002】

【従来の技術】図5（A）は従来の光ディスクの対物レンズ駆動装置の一例を示す斜視図であり、1は光ディスクでなる記録媒体に対面し、光ビームを収束して記録媒体に照射して光学的に情報を読み取るための対物レンズであり、該対物レンズ1はレンズホルダ2に保持される。3は位置決め機構（図示せず）により光ディスクの記録面に対してトラッキング方向に移動し位置決めされる基台である。レンズホルダ2は、4本の導電性弾性体

2

4a、4b、4c、4dを介して該基台3に対して移動自在に支持される。すなわち、基台3に設けた孔3aに導電性弾性体4a、4b、4c、4dを左右それぞれ2本ずつ挿通すると共に、該基台3に固定したプリント基板13に貫通し半田付けして導電性弾性体4a、4b、4c、4dの基端を固定し、先端をレンズホルダ2の側面に固定したプリント基板9に半田付けし固定することにより、レンズホルダ2を基台3に対して移動可能に片持ち式に支持している。レンズホルダ2には、フォーカシングコイル5とトラッキングコイル6を保持する。

【0003】一方基台3には、図6に示すように、これらのコイル5、6にそれぞれ流す電流i1、i2との電磁作用によって、レンズホルダ2すなわち対物レンズ1を、矢印Zに示すフォーカス方向と、矢印Yに示すトラッキング方向に駆動する磁気回路を構成するコ字形のヨーク7および永久磁石8a、8bが搭載される。なお、トラッキングコイル6は2組のコイルを一連に組んでフォーカシングコイル5に固着したもので、中央部aが2個の永久磁石8a、8b間の磁束と主として鎖交し、側部bは実質的に駆動に影響を与えないように外側に配置される。このように、対物レンズ1をフォーカス方向、トラッキング方向に移動し位置制御する理由は、ディスクの面振れや偏心に追従させて対物レンズ1を移動させるためである。

【0004】前述のように、レンズホルダ2の両側面には、導電性弾性体4a、4b、4c、4dにそれぞれコイル5、6の両端の端末を接続するためのプリント基板9が固定される。該プリント基板9は、図5（B）において一方のプリント基板について示すように、導電性弾性体4a、4bやコイル端末5a、6aを半田10により接続するランド部11とこれらのランド部11間を接続する銅箔12とを有する。

【0005】従来の他の対物レンズ駆動装置として、特開平6－274910号公報には、レンズホルダとコイルを巻いたボビンとを別体に構成し、ボビンをレンズホルダに取付け、ボビンに設けた突起にコイル端末をからげ、そのコイル端末に導電性弾性体を半田付けした構造が開示されている。

【0006】

【発明が解決しようとする課題】図5に示した従来の対物レンズ駆動装置においては、コイル端末5a、6a、5b、6bと導電性弾性体4a、4b、4c、4dとの結合に、中間部材として、両サイド合計2枚のプリント基板9を使用しているので、プリント基板9をレンズホルダ2に接着する作業が必要な上、半田付けも左右4箇所ずつ、合計8箇所行う必要があり、部品点数と工数が多くなるという問題点があった。また、小型化、薄型化に伴い、前記のプリント基板9も小型化が要求され、ランド部11が小さくなったり、コイル5、6と導電性弾性体4a、4b、4c、4dとを結ぶ銅箔12の部分が

短くなるため、半田付けそのものが困難になったり、コイル5、6と導電性弾性体4a、4b、4c、4dの一方を半田付けする時に、すでに半田付けしてある他方の半田が溶けてしまうなど、半田部の信頼性が低下するという問題があった。

【0007】また、前記公報に記載の構造、すなわちボビンにコイルを巻き、そのボビンをレンズホルダに取り付ける構造においては、レンズホルダ以外にボビンが必要となるので、部品点数が増大すると共に、ボビン取付け工程が必要となるので、工数の増加を招き、また、レンズホルダにボビンを設ける分だけスペースを必要とし、小型化、薄型化の障害になるという問題点があった。

【0008】本発明は、上記した問題点に鑑み、部品点数や工数が低減し、かつコイル端末の半田付け部の信頼性の向上や、小型化、薄型化に寄与できる構造の光ディスクの対物レンズ駆動装置を提供することを目的とする。

【0009】

【課題を解決するための手段】本発明の光ディスクの対物レンズ駆動装置は、光ディスクの記録面に対して移動され位置設定される基台に対し、対物レンズを保持する合成樹脂製レンズホルダを、導電性弾性体を介して、フォーカシング方向とトラッキング方向のうちの少なくとも一方向に移動自在に支持し、前記レンズホルダに突起を一体的に形成して設け、該レンズホルダ内に固定されたレンズホルダ駆動用の空心コイルの端末を前記突起にからげ、該突起にからげたコイルの端末に、前記導電性弾性体を直接半田付けしたことを特徴とする。

【0010】また、本発明は、前記レンズホルダに、導電性弾性体の方向と同方向に、かつ導電性弾性体の固定部の反対側に突出させて突起を一体的に形成して設け、該突起に導電性弾性体を添わせ、該突起と導電性弾性体にレンズホルダ内に固定されたレンズホルダ駆動用の空心コイルの端末をまとめてからげ、該からげたコイルの端末を、前記導電性弾性体に直接半田付けしたことを特徴とする。

【0011】本発明において、導電性弾性体やコイルは、接着によりレンズホルダに固定してもよいが、好ましくは、インサート成形により一体に固定する。

【0012】

【作用】本発明においては、レンズホルダに突起を設け、該レンズホルダにコイル端末をからげてそのコイル端末に導電性弾性体を直接半田付けするため、プリント基板は不要となる。また、レンズホルダが合成樹脂製であり、半田付けにおける半田付け部どうしの熱の伝達による悪影響の問題がない。また、空心コイルでなるレンズホルダ駆動用コイルをレンズホルダに固定し、コイル端末を突起をからげているので、ボビンは不要である。

【0013】また、レンズホルダに、導電性弾性体の方

向と同方向に、かつ導電性弾性体の固定部の反対側に突出させて突起を一体的に形成することにより設け、該突起に導電性弾性体を添わせることにより、該突起と導電性弾性体にレンズホルダ内に固定されたレンズホルダ駆動用の空心コイルの端末をまとめてからげることが可能となり、導電性弾性体と突起が合体されることにより、コイル端末のからげ部分の強度が大となり、また、からげたコイルの端末を、前記導電性弾性体に直接半田付けすることにより、半田付け部を導電性弾性体の長手方向に長くすることができる結果、半田付け面積が広くなり、半田付けが強固に行える。

【0014】レンズホルダにコイルや導電性弾性体をインサート成形により固定すれば、作業工程が簡略化され、位置決め精度が向上する。

【0015】

【実施例】図1（A）は本発明による対物レンズの駆動装置を示す斜視図、図1（B）は該実施例における導電性弾性体4とコイル端末5a、6aとの接続構造を示す側面図である。図1において、図5、図6と同じ符号は同じ部品を示す。レンズホルダ2は、後述の半田付け処理の際にも軟化、変形しない例えばポリフェニレンサルファイト（PPS）樹脂、全芳香族系ポリエステル樹脂（液晶ポリマー）等の耐熱性合成樹脂成形体よりなるものであり、該レンズホルダ2の両側面に、導電性弾性体4a、4b、4c、4dの結合部14を突出させて一体に形成し、該結合部14に、インサート成形によってりん青銅やベリリウム銅等の金属線材や板材からなる導電性弾性体4a、4b、4c、4dをそれぞれ2本ずつ固定する。なお、導電性弾性体4a、4b、4c、4dの結合部14に対する結合は、結合部14に孔を設けてその孔に導電性弾性体4a、4b、4c、4dを挿通し、接着剤により固定する構造も採用できる。導電性弾性体4a、4b、4c、4dの基端側の基台3に対する固定構造は図5で説明した通りである。

【0016】前記結合部14の近傍には、それぞれ2つのピン状突起15a、15bを、上下に間隔をもって、かつ外方に突出させて一体成形により設ける。そしてレンズホルダ2の片面に形成したピン状突起15a、15bに、図6に示したような空心コイルでなるフォーカシングコイル5の一方のコイル端末5aと、空心コイルでなるトラッキングコイル6の一方のコイル端末6aをからげ、また、他方のコイル端末5b、6bは、レンズホルダ2の他方の側面に前記突起15a、15bと同様に形成したピン状突起（図示せず）にからげる。このようにしてからげたコイル端末5a、6a、5b、6bを、導電性弾性体4a、4b、4c、4dにそれぞれ半田16により直接固定する。

【0017】なお、図1（A）、（B）においては、前記結合部14および突起15a、15bはレンズホルダ2の側面に設けているが、前記レンズホルダ2の上面ま

たは下面に結合部および突起を設けてもよい。

【0018】このように、レンズホルダ2に突起15a、15bを設け、これらの突起15a、15bにコイル端末5a、6a、5b、6bをからげ、これに導電性弾性体4a、4b、4c、4dを直接半田付けすることにより、従来のプリント基板9が不要となり、部品点数が低減される。また、プリント基板9をレンズホルダ2に接着する工程が不要となる上、半田付け箇所が4箇所に半減するので、工数も低減される。また、突起15a、15bはレンズホルダ2と同じ樹脂材料で形成され、突起15a、15b間の熱伝導性が前記プリント基板9の銅箔12より低いため、1箇所の半田付けが他方に与える熱的影響が少なく、既に半田付けしてある部分を後で半田付けする熱によって再び溶かすことがない。そのように、半田部間の熱的影響が軽減されることと、半田付けする箇所の間隔が広がることにより、半田付け自体が容易となり、かつ、半田部の信頼性を高めることができる。また、レンズホルダ2に突起を設ける方法としては、金属ピンをレンズホルダ2に埋込む方法もあるが、本発明のように、突起15a、15bを一体成形することにより、金属ピンをレンズホルダ2に固定する場合に比較し、工数および部品点数が低減される。

【0019】また、図2（A）の平面図に示すように、空心コイルでなるトラッキングコイル6を固定したフォーカシングコイル5を接着剤17によりレンズホルダ2の内壁に固定してもよいが、図2（B）に示すように、前記コイル5、6を一体成形によってレンズホルダ2の内空部に固定することにより、図2（A）に示す内空部のコーナーにおけるフォーカシングコイル5とレンズホルダ2の内壁との間の隙間18が無くなり、接着時におけるフォーカシングコイル5の位置ずれがなく、フォーカシングコイル5およびトラッキングコイル6のレンズホルダ2に対する位置決めが精度良く行える。また、フォーカシングコイル5のレンズホルダ2に対する接着工程が不要となり、工数が低減する。また、フォーカシングコイル5やトラッキングコイル6を設けたボビンをレンズホルダ2に取付ける場合に比較し、部品点数と工数が低減されると共に、フォーカシングコイル5とトラッキングコイル6の位置決め精度も向上する。

【0020】また、導電性弾性体4a、4b、4c、4dは結合部14の孔に挿通し、接着によって固定してもよいが、前記実施例のように、4本の導電性弾性体を一体成形によってレンズホルダ2に固定することにより、導電性弾性体4a、4b、4c、4dのレンズホルダ2に対する取付け作業が不要となる。

【0021】図3（A）、（B）はそれぞれ本発明の他の実施例を示す斜視図であり、いずれも、レンズホルダ2の側面部に、前記導電性弾性体4a、4bの結合部14から、導電性弾性体4a、4bの方向と同方向に、かつ導電性弾性体4a、4bの基台3への固定部の反対側に突出させて突起19a、19bまたは20a、20bを一体に形成し、該突起19a、19bまたは20a、20bに導電性弾性体4a、4bを添わせ、該突起19a、19bまたは20a、20bと導電性弾性体4a、4bにコイル端末5a、6aをまとめてからげ、該からげたコイルの端末5a、6aを、前記導電性弾性体4a、4bに直接半田16により固定したものである。導電性弾性体4c、4dについてもレンズホルダ2に同様に結合される。

【0022】このように、突起19a、19bまたは20a、20bに導電性弾性体4a、4bを添わせて同時にコイル端末5a、6aを巻くことにより、突起19a、19bまたは20a、20bと導電性弾性体4a、4bとの合体によってからげ部分の強度があがり、安定したコイル端末の固定が可能となり、また、半田16の面積が広がり、半田強度が上がる。特に、突起19a、19bまたは20a、20bに溝23a、23bあるいは24a、24bを設け、これらの溝23a、23bあるいは24a、24bに導電性弾性体4a、4bが嵌まり込んだ構造とすることにより、導電性弾性体4a、4bのずれがなく、結合強度があがる。また、導電性弾性体4a、4bの添設面は、図3（A）のように上向きにする場合に比較し、図3（B）のように添設面を縦面または傾斜面とすれば、半田付け作業が容易となる。

【0023】また、図3（C）に示すように、フォーカシング方向のみについて弾性を持たせる場合、あるいはフォーカシング方向とトラッキング方向とで導電性弾性体の弾性に差異を持たせるため、板状または断面角形の導電性弾性体21を用いる場合、突起19に対して面で導電性弾性体21を合わせることにより、からげによる結合強度があがり、また、半田付け部を導電性弾性体21の長手方向に長くすることができるので、半田16の広さも確保され、半田付け強度があがる。

【0024】また、図3（C）は、4本の導電性弾性体4a、4b、4c、4dを設ける前記実施例と異なり、左右それぞれ1本ずつの導電性弾性体21を設け、1種類のコイル（フォーカシングコイル5またはトラッキングコイル6）に導電性弾性体21を接続する対物レンズ駆動装置の例を示しているが、この他、ジッタ方向や対物レンズの媒体に対する傾き角度を補正するようなさらに多くの方向にレンズホルダ2を移動させる構造の対物レンズ駆動装置にも本発明の構造を適用することができる。

【0025】図4は本発明の他の実施例であり、本実施例は、レンズホルダ2を片持ち式ではなく、基台3と別に設けられる支持体22と基台3により導電性弾性体4a、4b、4c、4dの両端を支持し、導電性弾性体4a、4b、4c、4dの中間部にレンズホルダ2を前記図1の突起15と半田16を用いた構造で取付けたものであり、本実施例においても前記実施例と同様の効果が

あげられる。

【0026】なお、導電性弾性体として半田メッキや銅メッキが施された金属線を使用し、フォーカシングコイル5やトラッキングコイル6として低温半田付銅線を使用すれば、半田付けにおける作業性がさらに向上する。

【0027】

【発明の効果】請求項1によれば、レンズホルダの側面部に突起を一体成形により設け、該突起にレンズホルダ内に固定されたレンズホルダ駆動用の空心コイルの端末をからげ、該突起にからげたコイルの端末に、前記導電性弾性体を直接半田付けしたので、コイル端末と導電性弾性体との結合に用いたプリント基板が不要となり、また、コイルを巻いたボビンも不要となるので、部品点数が低減できる。また、プリント基板を用いる場合に比較して、プリント基板をレンズホルダに接着する工程が不要となり、かつ半田付け箇所の数が低減されるので、工数が低減される。また、ボビンをレンズホルダに取付ける従来構造に比較しても、部品点数と工数低減が達成できる。

【0028】また、コイル端末と導電性弾性体とを直接半田付けするので、プリント基板のランドが小さくなるとか、銅箔部が短くなるという問題が発生せず、小型、薄型化に際して半田付け自体が容易で、半田部の信頼性を向上できる。また、コイル端末の半田付け部を小さくする必要がなく、コイルを巻くボビンを設けるスペースも不要となるので、小型化、薄型化が達成できる。

【0029】請求項2によれば、レンズホルダの側面部に、導電性弾性体の方向と同方向に、かつ導電性弾性体の反対側に突出させて突起を一体成形により設け、該突起に導電性弾性体を添わせ、該突起と導電性弾性体にレンズホルダ内に固定されたレンズホルダ駆動用の空心コイルの端末をまとめてからげたので、突起と導電性弾性体とが互いに補強しあい、からげ部の強度があがり、安定したコイル端末の固定が可能となり、また、半田付け部を導電性弾性体の長手方向に長くすることができる結果、半田付け面積が広がり、半田付け強度が上がる。

【0030】請求項3によれば、導電性弾性体をレンズホルダにインサート成形により固定したので、導電性弾性体のレンズホルダに対する取付け作業が不要となり、工数の低減に寄与できる。

【0031】請求項4によれば、レンズホルダに駆動用コイルをインサート成形により固定したので、コイル取付けのための工数が低減され、コイルを接着あるいはボビンを使用して取付ける場合に比較して、位置決め精度が向上する。

【図面の簡単な説明】

【図1】（A）は本発明による対物レンズの駆動装置の一実施例を示す斜視図、（B）は該実施例におけるコイル端末と導電性弾性体との固定構造を示す側面図である。

【図2】（A）、（B）はレンズホルダにそれぞれ接着、一体成形によってコイルを取付けた場合のレンズホルダとコイルとの固定構造を示す平面図である。

【図3】（A）、（B）、（C）は本発明の他の実施例を示す斜視図である。

【図4】本発明の他の実施例を示す斜視図である。

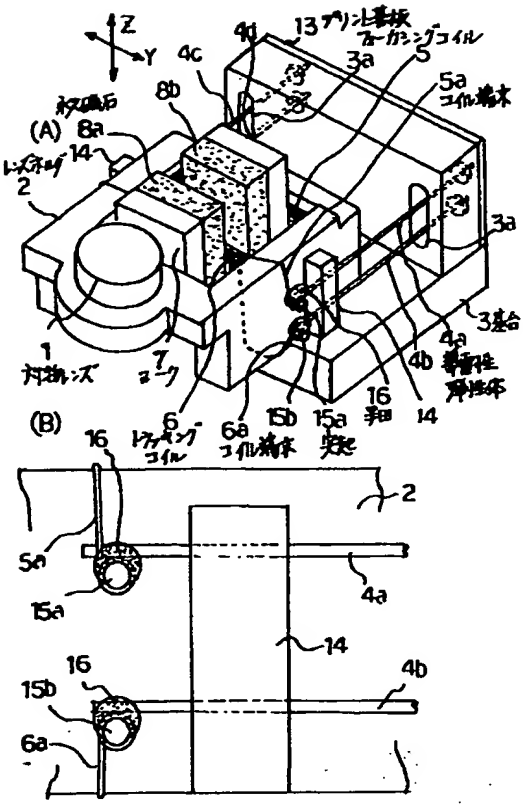
【図5】（A）は従来例を示す斜視図、（B）はそのコイル端末と導電性弾性体との固定構造を示す側面図である。

【図6】図5の駆動装置における作用説明図である。

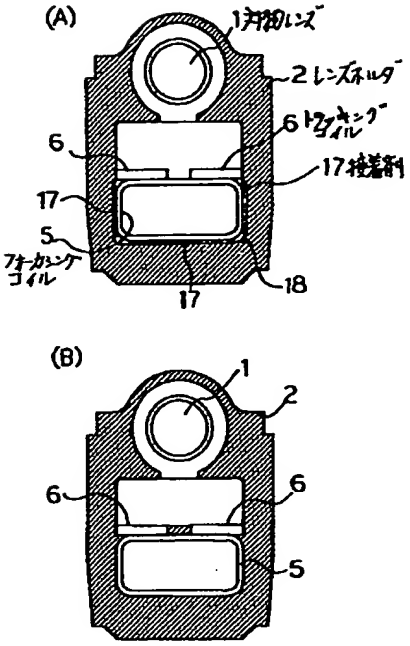
【符号の説明】

1：対物レンズ、2：レンズホルダ、3：基台、4a、4b、4c、4d、21：導電性弾性体、5：フォーカシングコイル、5a、5b、6a、6b：コイル端末、6：トラッキングコイル、7：ヨーク、8a、8b：永久磁石、14：導電性弾性体結合部、15a、15b、19a、19b、20a、20b：突起、16：半田、17：接着剤、18：隙間、22：支持体、23a、23b、24a、24b：溝

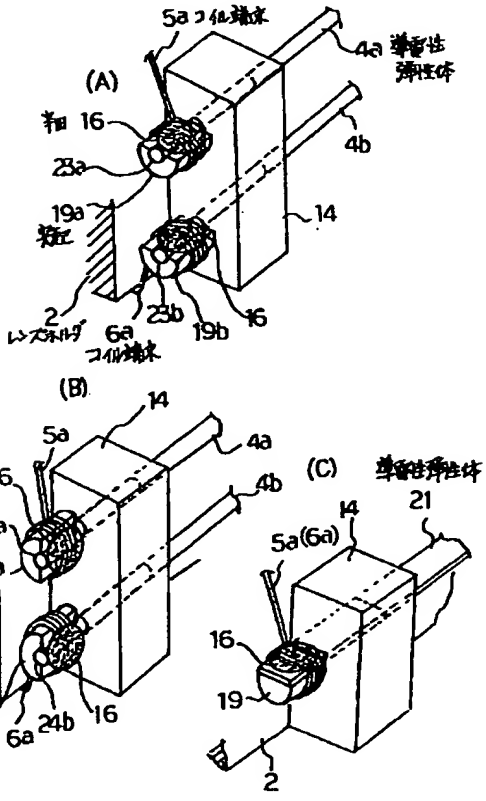
【図1】


Z
Y
(A)
(B)
1
対物レンズ
2
レンズホルダ
3a
3b
3基台
4a
4b
導電性弾性体
5
フォーカシングコイル
5a
コイル端末
6
トラッキングコイル
6a
コイル端末
7
ヨーク
8a
8b
14
15a
15b
16
半田
17
接着剤
18
プリント基板

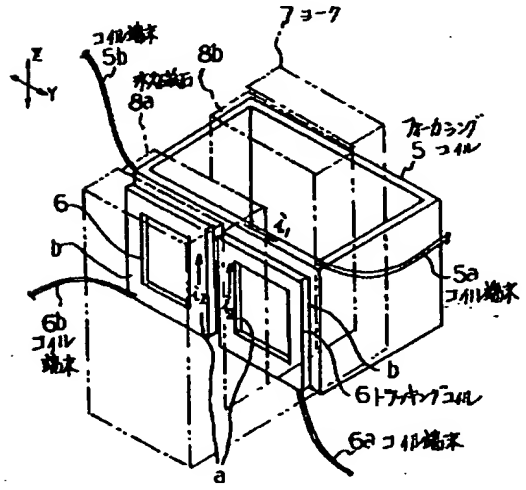
【図2】


(A)
(B)
1
対物レンズ
2
レンズホルダ
5
フォーカシングコイル
6
トラッキングコイル
17
接着剤
18

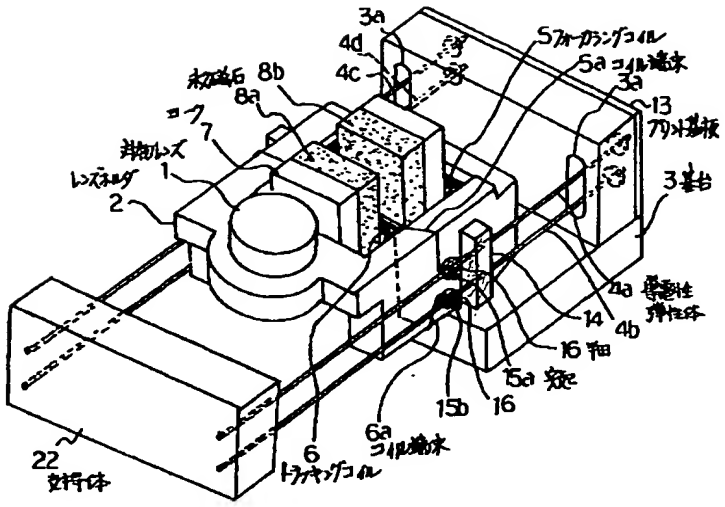
【図3】


(A)
(B)
(C)
5a
コイル端末
4a
導電性弾性体
4b
半田
16
23a
19a
接着
14
2
レンズホルダ
6a
コイル端末
23b
19b
5a
14
4a
4b
24a
20a
20b
接着
6a
24b
16
5a(6a)
14
21
16
19
2

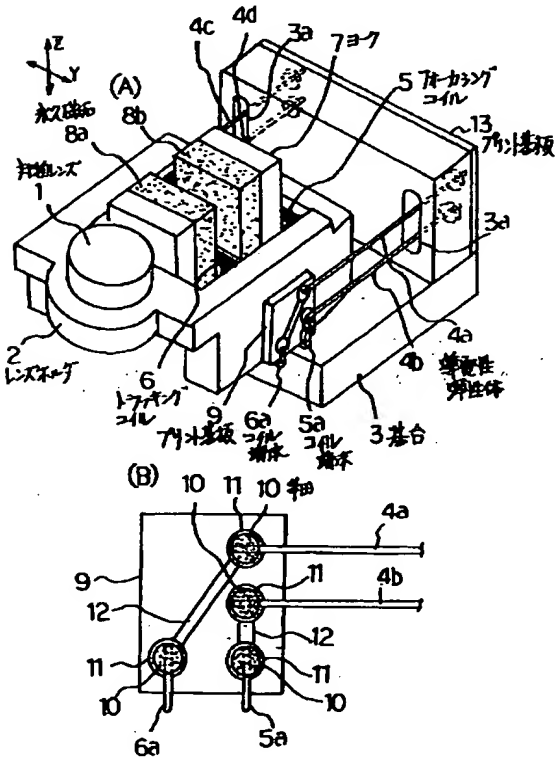
【図6】


7
ヨーク
5b
コイル端末
8b
8a
フォーカシング
5
コイル
6
トラッキングコイル
6b
コイル端末
6a
コイル端末
5a
コイル端末
a
b

【図4】


3a
4d
4c
8b
8a
ヨーク
7
対物レンズ
1
レンズホルダ
2
5フォーカシングコイル
5a コイル端末
3a
13
プリント基板
3基台
4a 導電性弾性体
14
4b
16 軸
15a 支点
15b
16
6a コイル端末
6 トラッキングコイル
22 支持体

【図5】


Z
Y
(A)
4c
4d
3a
7ヨーク
5 フォーカシング コイル
13 プリント基板
8b
8a
対物レンズ
1
3a
2 レンズホルダ
4a
4b 導電性弾性体
6 トラッキング コイル
9 プリント基板
6a コイル端末
5a コイル端末
3基台
(B)
10
11
10 軸
4a
9
11
4b
12
12
11
11
10
10
6a
5a